

Appln. S.N. 10/673,762  
Amdt. dated August 9, 2006  
Reply to Office Action of May 9, 2006  
Docket No. GP-302388-R&D-KM

2

In the claims:

1. (currently amended) A composite structure, comprising:  
a substrate;  
an interfacial barrier laminate formed of at least two layers and disposed over the substrate, wherein the at least two layers include at least one ceramic layer disposed adjacent the substrate and at least one metallic layer; and  
a contiguous diamond coating disposed over the interfacial barrier laminate wherein the at least one metallic layer is partially converted into a carbide layer.
2. (currently amended) The composite structure according to claim 1 wherein the interfacial barrier laminate includes at least a third layer disposed between the at least one ceramic layer and the substrate, and wherein the at least a third layer is selected from the group consisting of high recrystallization temperature amorphous nitrides, high recrystallization temperature amorphous borides, high recrystallization temperature amorphous carbides, and combinations thereof.
3. (cancelled)
4. (previously presented) The composite structure according to claim 1 wherein the at least one ceramic layer is selected from borides, nitrides and carbides of transition metals, and combinations thereof.
5. (currently amended) The composite structure according to claim 1 wherein the interfacial barrier laminate includes at least a third layer disposed between the at least one ceramic layer and the substrate, and wherein the at least a third layer selected from TiC, TiCN, TiAl, TiN, CrN, CrC, ZrN, ZrC, WC, SiC, Si<sub>3</sub>N<sub>4</sub>, and combinations thereof.
6. (cancelled)

Appln. S.N. 10/673,762  
Amdt. dated August 9, 2006  
Reply to Office Action of May 9, 2006  
Docket No. GP-302388-R&D-KM

3

7. (previously presented) The composite structure according to claim 1 wherein the interfacial barrier laminate contains an interfacial layer of  $\text{Al}_2\text{O}_3$  disposed between the at least one ceramic layer and the substrate.

8. (cancelled)

9. (previously presented) The composite structure according to claim 1 wherein the at least one metallic layer is selected from Cr, Ti, Zr, W, Ni, and combinations thereof.

10. (original) The composite structure according to claim 1 wherein the interfacial barrier laminate is between 2  $\mu\text{m}$  and 15  $\mu\text{m}$  thick.

11. (original) The composite structure according to claim 1 wherein the interfacial barrier laminate is between 5  $\mu\text{m}$  and 10  $\mu\text{m}$  thick.

12. (previously presented) The composite structure according to claim 1 wherein the at least one ceramic layer of the interfacial barrier laminate is between 2  $\mu\text{m}$  and 5  $\mu\text{m}$  thick.

13. (previously presented) The composite structure according to claim 1 wherein the at least one metallic layer of the interfacial barrier laminate is between 2  $\mu\text{m}$  and 7  $\mu\text{m}$  thick.

14. (currently amended) The composite structure according to claim 1 wherein the carbide layer of the at least one metallic layer is between 1  $\mu\text{m}$  and 3  $\mu\text{m}$  thick and faces the contiguous diamond coating.

15. (currently amended) A composite laminate, comprising:  
a carbon-sensitive substrate;

Appln. S.N. 10/673,762  
Amdt. dated August 9, 2006  
Reply to Office Action of May 9, 2006  
Docket No. GP-302388-R&D-KM

4

an interfacial barrier laminate configured to inhibit the diffusion of carbon, the interfacial barrier laminate formed of at least two layers including a metallic layer and a ceramic layer, the ceramic layer being disposed adjacent the carbon-sensitive substrate;  
a carbide-rich coating disposed over the interfacial barrier laminate; and  
a contiguous diamond layer disposed over the carbide-rich coating.

16. (currently amended) The composite laminate according to claim 15 wherein the interfacial barrier laminate includes at least a third layer disposed between the ceramic layer and the carbon-sensitive substrate, and wherein the at least a third layer selected from the group consisting of high recrystallization temperature amorphous nitrides, high recrystallization temperature amorphous borides, high recrystallization temperature amorphous carbides and combinations thereof.

17. (previously presented) The composite laminate according to claim 15 wherein the ceramic layer is selected from the group consisting of borides, nitrides and carbides of transition metals, and combinations thereof.

18. (currently amended) The composite laminate according to claim 15 wherein the interfacial barrier laminate includes at least a third layer disposed between the carbon-sensitive substrate and the ceramic layer carbide-rich coating, wherein the at least a third layer is selected from TiC, TiCN, TiAl, TiN, CrN, CrC, ZrN, ZrC, and combinations thereof.

19. (currently amended) The composite laminate according to claim 15 wherein the interfacial barrier laminate comprises an interfacial layer of Al<sub>2</sub>O<sub>3</sub> disposed between the carbon-sensitive substrate and the ceramic layer carbide-rich coating.

Appln. S.N. 10/673,762  
Amdt. dated August 9, 2006  
Reply to Office Action of May 9, 2006  
Docket No. GP-302388-R&D-KM

5

20. (previously presented) The composite laminate according to claim 15 wherein the metallic layer is selected from Cr, Ti, Zr, W, Ni, and combinations thereof, and wherein the metallic layer is disposed between the ceramic layer and the carbide-rich coating.

21. (previously presented) The composite laminate according to claim 15 wherein the metallic layer of the interfacial barrier laminate is a metal which forms carbides in the presence of carbon.

22. (previously presented) The composite laminate according to claim 15 wherein the interfacial barrier laminate is between 5  $\mu\text{m}$  and 10  $\mu\text{m}$  thick.

23. (cancelled)

24. (cancelled)

25. (original) The composite laminate according to claim 15 wherein the substrate comprises steel.

26. (previously presented) The composite laminate according to claim 15 wherein the substrate comprises cemented carbide.

27. (withdrawn, currently amended) A cutting tool comprising:  
a carbon sensitive substrate;  
a ceramic layer disposed over the carbon sensitive substrate configured to inhibit the diffusion of carbon;  
a metallic layer disposed over the ceramic layer;  
a carbide layer disposed over said metallic layer; and  
a contiguous diamond layer disposed over said carbide layer.

Appln. S.N. 10/673,762  
Amdt. dated August 9, 2006  
Reply to Office Action of May 9, 2006  
Docket No. GP-302388-R&D-KM

6

28. (withdrawn) The cutting tool according to claim 27 wherein the carbon sensitive substrate is steel.

29. (withdrawn) The cutting tool according to claim 28 wherein steel is heat-treated after the diamond deposition, resulting in a substrate with a martensite structure.

30. (withdrawn) The cutting tool according to claim 27 wherein the carbon sensitive substrate is cemented carbide.

31. (withdrawn, currently amended) The cutting tool according to claim 27 wherein the ceramic layer is comprising an interfacial layer disposed between said substrate and said diamond layer selected from the group consisting of borides, nitrides and carbides of transition materials and combinations thereof.

32. (withdrawn, currently amended) The cutting tool according to claim 27, further comprising a layer disposed between the ceramic layer and the carbon sensitive substrate, the layer comprising an interfacial layer selected from the group consisting of TiC, TiCN, TiAl, TiN, CrN, CrC, ZrN, ZrC, WC, SiC, Si<sub>3</sub>N<sub>4</sub>, and combinations thereof disposed between said substrate and said diamond layer.

33. (withdrawn, currently amended) The cutting tool insert according to claim 27, further comprising an interfacial layer of Al<sub>2</sub>O<sub>3</sub> disposed between the ceramic layer and the carbon sensitive substrate Al<sub>2</sub>O<sub>3</sub> disposed between said substrate and said diamond layer.

34. (withdrawn, currently amended) The cutting tool according to claim 27 wherein the metallic layer is comprising an interfacial layer selected from the group consisting of Cr, Ti, Zr, and Si and combinations thereof disposed between said substrate and said diamond layer.

Appln. S.N. 10/673,762  
Amdt. dated August 9, 2006  
Reply to Office Action of May 9, 2006  
Docket No. GP-302388-R&D-KM

7

35. (withdrawn, currently amended) The cutting tool according to claim 27, further comprising a layer of mixed sp<sup>2</sup>- and sp<sup>3</sup>-bonded carbon established on the contiguous diamond layer.

36. – 41. (cancelled)

42. (previously presented) The composite structure according to claim 1 wherein the interfacial barrier laminate comprises at least two ceramic layers.

43. (previously presented) The composite structure according to claim 1 wherein the interfacial barrier laminate comprises at least two metallic layers.

44. (previously presented) The composite laminate according to claim 15 wherein the interfacial barrier laminate comprises at least two ceramic layers.

45. (previously presented) The composite laminate according to claim 15 wherein the interfacial barrier laminate comprises at least two metallic layers.